

# **FOODBORNE DISEASE OUTBREAKS REPORTED IN CALIFORNIA**

## **1998**



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## INTRODUCTION

Foodborne disease outbreaks (FBDO) are reported to the California Department of Health Services (DHS), Division of Communicable Disease Control (DCDC) by local health departments (LHDs). This surveillance system serves several purposes: (1) to prevent and control outbreaks by identification and removal of contaminated products, (2) to identify and correct faulty food-handling and food-production practices, (3) to increase the knowledge and understanding of disease causation, and (4) to develop food safety programs and policies based on findings of FBDO investigations. Summaries of foodborne diseases and outbreaks reported in California for previous years have been reported. This report summarizes FBDOs reported in California that occurred in 1998.

## METHODS

### *Sources of Data*

FBDOs are reported to DHS on a standardized national reporting form (Centers for Disease Control and Prevention [CDC] Form #52.13, Investigation of a Foodborne Outbreak). Most of these reports are prepared by LHDs and sometimes by DCDC, especially when the outbreak involves multiple jurisdictions. Data on these report forms and any supplemental materials or reports are reviewed to determine whether specific food vehicles and etiologic agents were identified, and reviewed further for epidemiologic and laboratory support for those conclusions.

### *Definition of Terms*

A FBDO is defined as the occurrence of two or more cases of a similar illness resulting from the ingestion of a common food. Outbreaks of known etiology are those for which laboratory evidence of a specific agent is obtained and specified criteria are met. Outbreaks of suspected etiology are those for which the etiology is suspected based on a variety of information including symptoms, incubation period, laboratory results, and implicated food vehicle. Outbreaks of unknown etiology are those for which either no laboratory evidence exists or no single etiologic agent is suspected.

### *Limitations of the Surveillance System*

The limitations of the data presented in this report must be recognized to avoid misinterpretation. The number of reported FBDOs represents only a small fraction of the outbreaks that occur. The likelihood of an outbreak coming to the attention of health officials varies considerably depending on patient and physician awareness and interest, and the motivation of ill persons and/or their physicians to report the incident. Ill persons must seek medical attention, have appropriate specimens collected, and then have that disease reported to the LHD to enter into the disease reporting system. The LHD or DCDC must additionally recognize individually reported cases as part of

an outbreak. Large outbreaks, multi-county or multi-state outbreaks, restaurant-associated outbreaks, and outbreaks involving serious illness, hospitalizations, or deaths are more likely to come to the attention of health authorities than, for example, cases of mild illness after a family meal. Outbreaks with short latency periods (e.g., due to staphylococcal enterotoxin and chemical agents) are more likely to be recognized and reported than diseases with longer incubation periods (e.g., hepatitis A and cryptosporidiosis). DCDC has been increasing efforts to recognize, investigate, and report FBDOs. First, two counties (Alameda and San Francisco) in California became FoodNet sites in 1996 as part of an ongoing nationwide effort to enhance the surveillance, investigation, and understanding of foodborne illnesses. Second, the DHS Microbial Diseases Laboratory (MDL) and Viral and Rickettsial Disease Laboratory (VRDL) have made major contributions to FBDO epidemiologic investigations by showing linkage of cases by pulsed-field gel electrophoresis (PFGE), phage typing, and other molecular subtyping methods. Third, the Disease Investigations and Surveillance Branch (DISB) has encouraged FBDO reporting through memos to LHDs. Fourth, DISB has been investigating and reporting outbreaks involving multiple counties.

### *Interpretation of Data*

A LHD's interest in foodborne disease and its resources for epidemiologic and laboratory investigation are important determinants of the extent to which foodborne diseases are investigated, the quality of those investigations, and the likelihood such investigations will be reported. Accordingly, it should not be concluded that local health jurisdictions with the highest foodborne illness rates pose the greatest risk for acquiring these diseases. Furthermore, a large amount of rate variability is expected due to the low numerator in the rate calculation.

## **RESULTS**

Data from the DHS surveillance system for reported FBDOs are presented as follows: outbreaks by year of onset, 1993-1998 (Figure 1), 1998 outbreaks and cases, by etiology and LHD (Tables 1-3, Figure 2), 1998 outbreaks by month of occurrence (Figure 3), 1998 outbreaks by the place where the implicated food was consumed (Figure 4), and selected 1998 outbreak reports.

### *Reported Foodborne Disease Outbreaks*

A total of 104 FBDOs, involving 3,019 cases, were reported to DHS with onsets in 1998 (Figure 1). Reports were received from 21 LHDs (Tables 1 and 2, Figure 2). Los Angeles County reported the largest number of outbreaks (35), followed by Orange County (16), and San Diego County (10). Seven multi-county outbreaks were reported representing 289 cases. The etiologic agent was confirmed in 48 (46%) FBDOs, suspected in 32 (31%) FBDOs, and unknown in 24 (23%) FBDOs (Figure 3). FBDOs ranged in size from 2 cases of *E. coli* O157:H7 associated with an unknown vehicle to 318 cases of *Shigella sonnei* associated with salsa consumption.

Bacterial pathogens were confirmed or suspected in 51 outbreaks (49%) and accounted for 1,461 cases (Tables 1-2). *Salmonella* was isolated in the majority of the

bacterial FBDOs (29 outbreaks, 584 cases) followed by *Shigella* (7 outbreaks, 628 cases) and *E. coli* O157 (5 outbreaks [4 H7 and 1 non-motile], 80 cases). Eighteen outbreaks (219 cases) were due to *Salmonella* serotype Enteritidis, of which six outbreaks (33%) had a confirmed vehicle identified (by positive culture from food or epidemiologic implication) and five of these six outbreaks (83%) were associated with raw or undercooked shell egg-containing vehicles.

Chemical agents were confirmed or suspected in five outbreaks (129 cases). Scombrototoxin was suspected in three outbreaks (13 cases), ciguatera suspected in one outbreak (8 cases) and one methomyl (pesticide) poisoning FBDO was confirmed (108 cases). No outbreaks due to parasitic agents were reported. Viral pathogens were confirmed or suspected in 24 outbreaks (943 cases). A small, round structured virus (SRSV) was suspected in 22 outbreaks (812 cases), a calicivirus group 2 was confirmed in one outbreak (171 cases), and Norwalk virus was confirmed in another outbreak (93 cases).

The greatest number of reported FBDOs in 1998 (Figure 3) had onsets in the month of May (14) followed by August (12), December (12), and June (11). The 104 FBDOs reported in 1998 represent a 44 percent increase compared to the 72 FBDOs reported with onsets in 1997 (Figure 1), and a 63 percent increase compared to the previous five-year average of 63.8 (1993-1997).

The most common site of food preparation for the reported FBDOs was a restaurant (55%) followed by a private home (18%). The most common place of food consumption (Figure 4) was a restaurant (46%), followed by other sites (26%) including worksites and camps, and private homes (19%).

### **Selected Outbreak Reports (summaries of the most notable FBDOs in 1998)**

- 1. Gastroenteritis Associated with Tomales Bay Oysters (May 1998).** Nearly 200 cases of gastroenteritis from seven counties were identified in the greater San Francisco Bay area. The etiologic source was determined to be a Small Round Structured Virus (SRSV), specifically a group 2 calicivirus, as determined by reverse transcriptase polymerase chain reaction (RT-PCR) analysis of stools studied at CDC, by serology studied at an out-of-state reference research center, and by study of oysters at federal Food and Drug Administration (FDA) laboratories in Alabama and California. The only known reservoir for this Norwalk-like pathogen is humans; and, though the source of the oyster bed contamination was never definitely determined, the most likely sources were substandard, potentially failing septic systems in homes at shoreline at Tomales Bay or overboard discharge(s) of toilet wastes from a recreational or commercial boater. Harvesting was permitted to resume only after laboratory studies of split samples of oysters, taken one month apart, studied at three different laboratories, were all negative for SRSVs.
- 2. Assault by Salt: A Foodborne Outbreak Due to Contamination of Table Salt by an Agricultural Pesticide (December 1998).** There was an investigation of a large and unusual gastrointestinal outbreak among patrons of a Thai restaurant in the Central Valley who became ill in late December 1998. Studied were 108 cases and 185 controls. The median latency period was 40 minutes, and the median duration of symptoms was 5.5 hours. There were no reported hospitalizations or deaths.

Ninety-five percent of cases reported nausea, 71% dizziness, 58% abdominal cramps, 52% headache, 50% vomiting, 46% diarrhea, and 14% subjective fever. Illness was associated with a variety of foods but no single dish could explain a substantial number of cases. Bacterial cultures (stool and food samples) were negative. Laboratory analysis identified the pesticide methomyl in vomitus (20 parts per million [ppm]) and in salt from the storage container (4,800 ppm, an amount representing 2% by weight). Microscopic examination of the contents of this container revealed two different crystals: methomyl and salt. By studying specific meal exposures where there was at least one reported illness, a dose-response relationship was observed between salt intake and risk for illness ( $p=0.02$ ). Clinical, epidemiologic, and laboratory evidence suggested that the foodborne outbreak was caused by methomyl intoxication resulting from contamination of a storage container of salt; it appears to have been intentional poisoning. Accordingly, a criminal investigation was launched.

3. **Sprout-Associated Outbreaks.** In June there was an outbreak of eight Shiga-toxin producing *E. coli* O157: non-motile infections in Northern California and Reno, Nevada; all isolates had matching PFGE patterns. A case-control study found an association between consumption of “alfalfa” sprouts and infection with the outbreak strain (100% of six cases vs. 0% of 10 age-, sex-, and telephone-exchange matched controls consumed “alfalfa” sprouts). A traceback of “alfalfa” sprouts eaten by case-patients revealed that they were actually alfalfa-clover mixed sprouts from a sprouter in Northern California. The residence of the eight patients matched the distribution of sprouts from the implicated sprouter. Alfalfa-clover sprouts from this sprouter were also implicated in an outbreak of 60 laboratory-confirmed infections of *Salmonella* Senftenberg in Northern California and Nevada residents, occurring from September 1997 through July 1998. Sprouts from a growing drum from the implicated facility grew *Salmonella* Senftenberg with a PFGE pattern that matched the PFGE pattern from human isolates, but did not grow *E. coli* O157. These investigations culminated in a voluntary recall of alfalfa-clover mixed sprouts in July 1998 and a press release in August 1998 advising the public that those who wish to reduce their risk of foodborne illness should avoid eating raw alfalfa sprouts.
4. ***Shigella sonnei* Outbreak Associated with Imported Fresh Cilantro (September 1998).** The largest outbreak of *Shigella sonnei* in California in the 1990s occurred in Mendocino County, with over 300 reports of diarrheal illnesses and 62 confirmed cultures. A case-control study revealed that salsa served in a Mexican restaurant was the implicated vehicle (97% of 34 cases vs. 44% of 16 dining companion controls). PFGE revealed that the outbreak strain had an indistinguishable pattern from a strain involved in concurrent outbreaks in some other states (Minnesota, Massachusetts, Florida) and Canada (Ottawa), where parsley was implicated. The restaurant did not use parsley but one ingredient in its salsa was cilantro. A traceback investigation found that the cilantro likely came from a farm in Mexico which also produced the parsley. The use of recirculated and unchlorinated water in a hydrocooler in the farm might have contributed to contamination of the produce. The outbreak ended after the restaurant was closed.

## DISCUSSION

As in previous years, bacterial pathogens were responsible for most of the FBDOs and cases with a confirmed etiology. However, 53 percent of the FBDOs were of unknown or suspected etiologies, highlighting the need for improved epidemiologic and laboratory investigations. Many of these undiagnosed outbreaks were suspected to have been caused by viruses, a much more important cause of FBDOs than is currently recognized. Resources are available at VRDL to assist with the diagnosis of FBDOs with a viral etiology. The majority of viral and chemical FBDOs are unconfirmed due to limitations in agent detection and the requirements for rapid specimen collection and specific laboratory testing. Whenever a case of viral or chemical etiology is suspected, proper specimens should be obtained in a timely fashion and specific tests should be requested in consultation with the laboratory.

The increase in the number of reported FBDOs in 1998 compared to previous years may be due to several factors including consumer behavior; production and distribution of the food supply; new or reemerging pathogens; increased surveillance, recognition, investigation, and reporting of FBDOs by LHDs; enhanced surveillance for FBDOs by molecular epidemiologic methods; and increased awareness among the public and medical communities.

Although restaurants were the most common place of food consumption for FBDOs, illnesses after consumption of foods in homes are probably underrepresented, as these are less likely to be reported and investigated.

The epidemiology of foodborne disease has changed in recent years. New pathogens, new vehicles such as raw produce, changes in consumer behavior such as eating more meals away from home, globalization of the food supply, and changes in the way food is produced and distributed are factors that influence the type and occurrence of FBDOs today. Through enhanced epidemiologic and laboratory surveillance, more outbreaks are also being detected and investigated. Early recognition, investigation, and sample collection are essential to: (1) control a FBDO, (2) understand what factors contributed to the outbreak, and (3) prevent future outbreaks.

## RECOMMENDATIONS

LHDs should be aware of the following resources:

- ◆ A document being issued by DCDC and the Division of Food, Drug, and Radiation Safety entitled “The Relative Roles and Responsibilities of Local Agencies (Local Health Departments and Local Environmental Health Departments) and State Agencies (Disease Investigations and Surveillance Branch and the Food and Drug Branch) in the Investigation of Foodborne Disease Outbreaks in California.”
- ◆ “Procedures to Investigate Foodborne Illness, 5<sup>th</sup> edition.” Des Moines, Iowa, 1999. To obtain a copy, contact the International Association for Food Protection (formerly IAMFES) at 1-800-369-6337 or visit [www.foodprotection.org](http://www.foodprotection.org) for more information.

- ◆ The FDA's three-part video course on: (1) Food Microbiological Control, (2) Foodborne Epidemiological Investigations, and (3) Traceback Investigations. These video courses and manuals are available for loan, at no charge, through the FDA by calling (301) 594-3682 or visiting the website at [http://www.fda.gov/ora/training/course\\_ora.html](http://www.fda.gov/ora/training/course_ora.html)
- ◆ DCDC staff are available for consultation and assistance with FBDO investigations. Please call (510) 540-2566 during normal business hours or (510) 540-2308 after hours or on weekends. For laboratory questions or assistance, please contact the MDL at (510) 540-2242 or the VRDL at (510) 540-2573.

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Chin J. Control of Communicable Disease Manual, 17<sup>th</sup> edition. American Public Health Association, 2000. <http://www.apha.org/media/science.htm>

Massachusetts Foodborne Illness Investigations and Control Manual  
<http://www.state.ma.us/dph/fpp/refman.htm>

FDA Bad Bug Book <http://vm.cfsan.fda.gov>

**Table 1. Reported Foodborne Disease Outbreaks by Local Health Department, Etiology, and Confirmation Status, CA, 1998\*\***

LHD	Bacterial																			Chemical			Viral			Confirmed Etiology	Suspected Etiology	Unknown Etiology	Total								
	Bacterial-Unspecified	Bacillus cereus	B. cereus/C. perfringens	Clostridium botulinum	Clostridium perfringens	E. coli O157:H7	E. coli O157:NM	Salmonella Baitdon	Salmonella Braenderup	Salmonella Coeln	Salmonella Copenhagen	Salmonella Cubana	Salmonella Enteritidis	Salmonella Havana	Salmonella Heidelberg	Salmonella Montevideo	Salmonella Newport	Salmonella Thompson	Salmonella -Multiple Types	Shigella boydii	Shigella flexneri	Shigella sonnei	Vibrio parahaemolyticus	Subtotal - Bacterial Etiology	Ciguatoxin					Methomyl (Pesticide)	Scombroid	Subtotal - Chemical Etiology	Calicivirus (group 2)	Norwalk	SRSV	Subtotal - Viral Etiology	
Fresno																										1*		1					1			1	
Long Beach													1											1									1		1		
Los Angeles												1	14		1		1	1	1				2	(1)	22	(1)			1		1	(9)	10	22	11	2	35
Mendocino																						2*		2									2			2	
Monterey													1											1									1			1	
Orange			(1)													1				1				3							(3)	3	2	4	10	16	
Placer											1													1									1			1	
Riverside																																			1		1
Sacramento						1																		1									1			1	
San Bernardino	(1)																							1							(1)	1		2	2	4	
San Diego		(1)			1(1)																			3			(1)	1					1	3	6	10	
San Francisco													1											1							(2)	2	1	2		3	
San Joaquin						1																		1									1			1	
San Mateo										1														1			(1)	1			(1)	1	1	2		3	
Santa Barbara						1																		2			(1)	1					2	1		3	
Santa Clara					(1)															1				2							(1)	1	1	2	1	4	
Santa Cruz																															(1)	1		1		1	
Solano		1																						1										1		1	
Sonoma																					1			1							(1)	1	1	1	1	3	
Stanislaus				1		1																		2							(2)	2	2	2	1	5	
Multiple Counties							1	1	1				1	1									5						1*		(1)	2	6	1		7	
Total	1	2	1	1	3	4	1	1	1	1	1	1	18	1	1	1	1	1	1	2	1	4	2	51	1	1	3	5	1	1	22	24	48	32	24	104	

\*\* Reported Outbreaks with onset in 1998

\* Outbreak findings summarized in report

**FBDO Confirmation Status:** Confirmed - #  
Suspected - (#)

Note: Multistate outbreaks are not included

Source: California Department of Health Services, Disease Investigations and Surveillance Branch

**Table 2. Reported Foodborne Disease Outbreak Rates per 100,000 Population by Local Health Department, California, 1998\***

<b>Local Health Department</b>	<b># FBDO</b>	<b>FBDO Rate</b>	<b>Population**</b>
Mendocino	2	2.29	87,448
Stanislaus	5	1.15	434,835
Santa Barbara	3	0.74	404,526
Sonoma	3	0.68	441,349
Orange	16	0.58	2,744,995
Placer	1	0.45	224,464
San Mateo	3	0.41	723,524
Santa Cruz	1	0.40	251,475
Los Angeles	35	0.39	9,037,720
San Francisco	3	0.38	784,264
San Diego	10	0.35	2,823,630
Solano	1	0.26	384,847
Monterey	1	0.26	387,989
San Bernardino	4	0.24	1,652,363
Santa Clara	4	0.24	1,700,976
Long Beach	1	0.22	445,500
San Joaquin	1	0.18	554,263
Fresno	1	0.13	789,319
Sacramento	1	0.09	1,166,303
Riverside	1	0.07	1,470,398
Multiple Counties	7	N/A	N/A
<b>California</b>	<b>104</b>	<b>0.31</b>	<b>33,494,000</b>

\*Reported outbreaks with onset in 1998

\*\*State of California, Department of Finance, Historical City/County Population Estimates, 1991-2000, with 1990 Census Counts, Sacramento, California.

Note: Rates may be highly variable due to low numerator values

Source: California Department of Health Services, Disease Investigations and Surveillance Branch

**Table 3. Number of Reported Foodborne Disease Outbreaks and Cases by Etiology, California, 1998\***

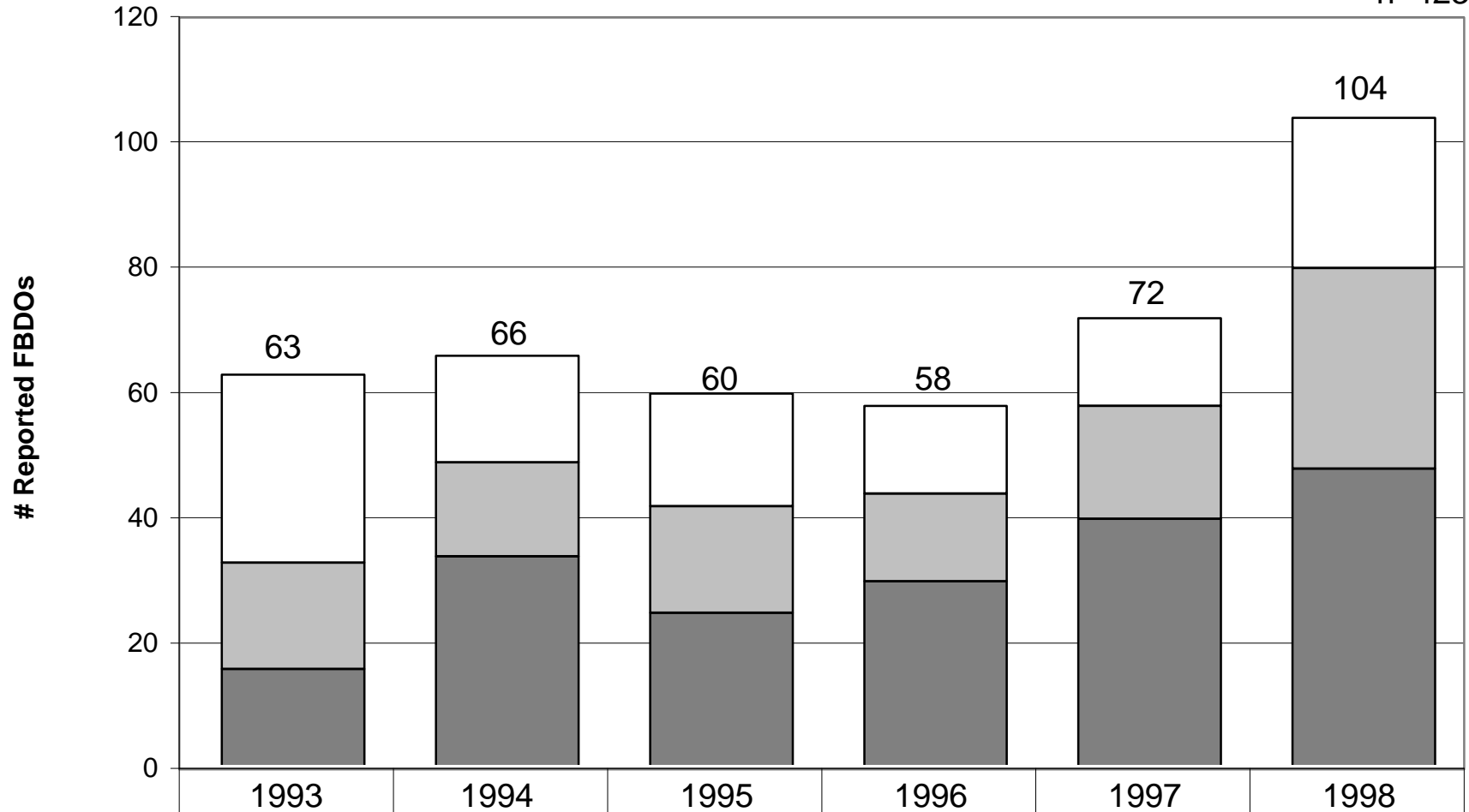
Etiology	Outbreaks		Cases		Average Cases/OB
	No.	(%)	No.	(%)	No.
<b>Confirmed etiology</b>	48	46.2	1730	57.3	36.0
<b>Bacterial</b>					
<i>Bacillus cereus</i>	1	1.0	11	0.4	11.0
<i>Clostridium botulinum</i>	1	1.0	3	0.1	3.0
<i>Clostridium perfringens</i>	1	1.0	48	1.6	48.0
<i>Escherichia coli</i>	5	4.8	80	2.6	16.0
<i>Salmonella</i>	29	27.9	584	19.3	20.1
<i>Shigella</i>	7	6.7	628	20.8	89.7
<i>Vibrio parahaemolyticus</i>	1	1.0	4	0.1	4.0
<b>Total bacterial</b>	<b>45</b>	<b>43.3</b>	<b>1358</b>	<b>45.0</b>	<b>30.2</b>
<b>Chemical</b>					
Methomyl (pesticide)	1	1.0	108	3.6	108.0
<b>Total chemical</b>	<b>1</b>	<b>1.0</b>	<b>108</b>	<b>3.6</b>	<b>108.0</b>
<b>Viral</b>					
Calicivirus group 2	1	1.0	171	5.7	171.0
Norwalk	1	1.0	93	3.1	93.0
<b>Total viral</b>	<b>2</b>	<b>1.9</b>	<b>264</b>	<b>8.7</b>	<b>132.0</b>
<b>Suspected etiology</b>	32	30.8	812	26.9	25.4
<b>Unknown etiology</b>	24	23.1	477	15.8	19.9
<b>Total 1998</b>	<b>104</b>	<b>100.0</b>	<b>3019</b>	<b>100.0</b>	<b>29.0</b>

\*Reported outbreaks with onset in 1998

Source: California Department of Health Services, Disease Investigations and Surveillance Branch

**Figure 1. Reported Foodborne Disease Outbreaks by Year of Onset and Etiologic Agent Confirmation Status, CA, 1993-1998**

n=423

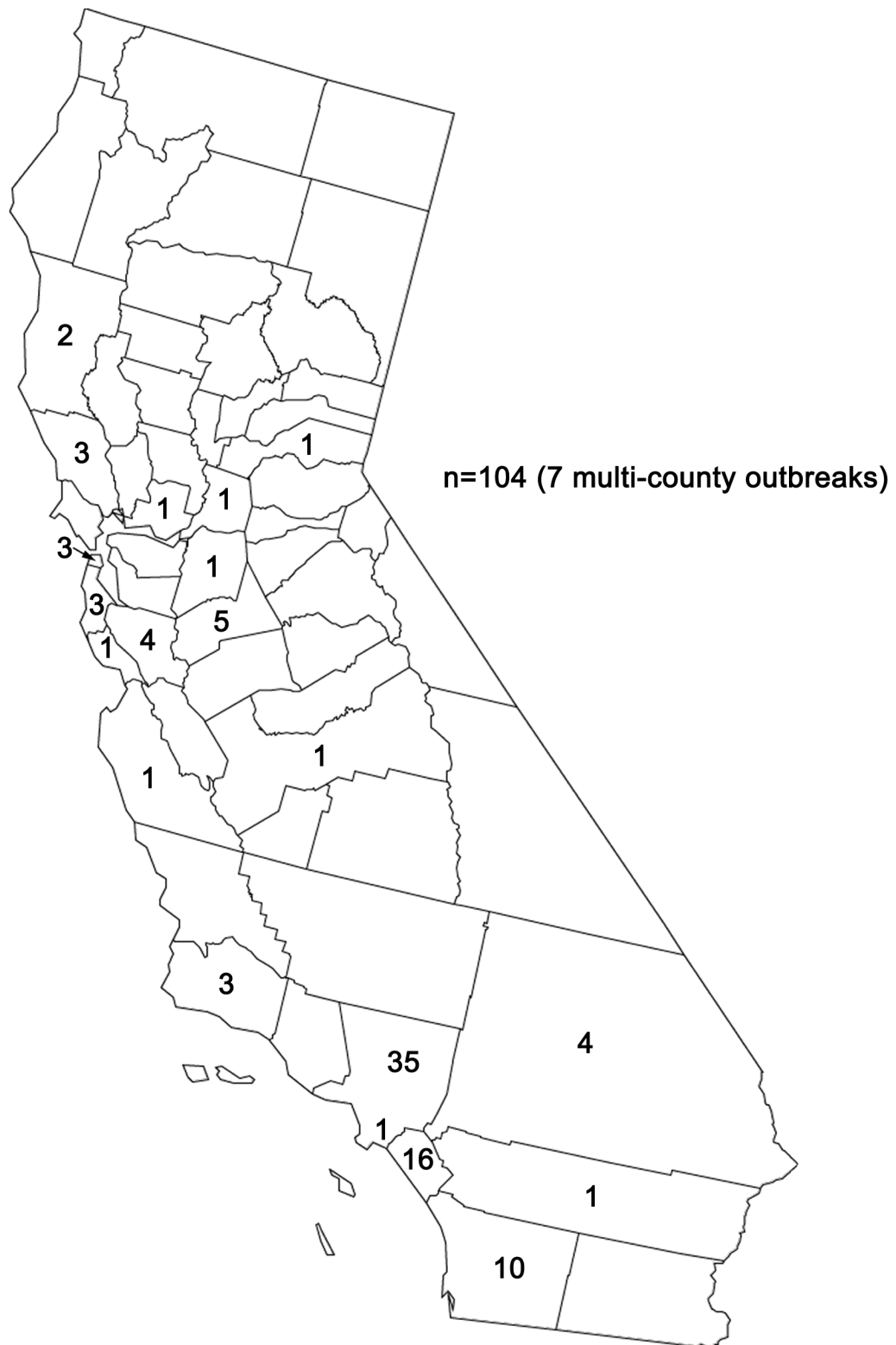


□Unknown	30	17	18	14	14	24
▒Suspected	17	15	17	14	18	32
■Confirmed	16	34	25	30	40	48

**Year of Onset**

Source: California Department of Health Services, Disease Investigations and Surveillance Branch

**Figure 2. Reported Foodborne Disease Outbreaks by Local Health Department, CA, 1998\***

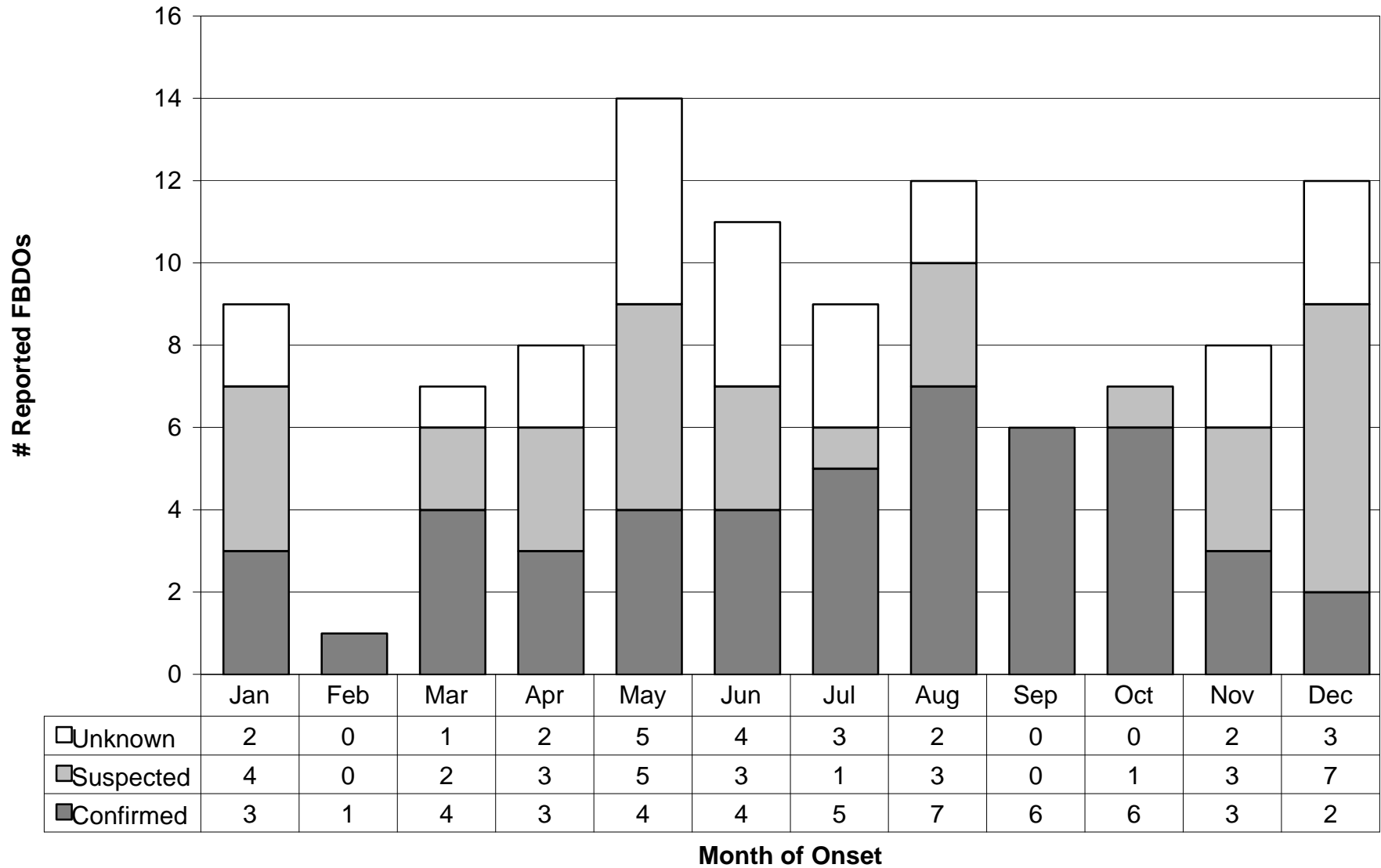


**\* Reported outbreaks with onset in 1998**

Source: California Department of Health Services, Disease Investigations and Surveillance Branch

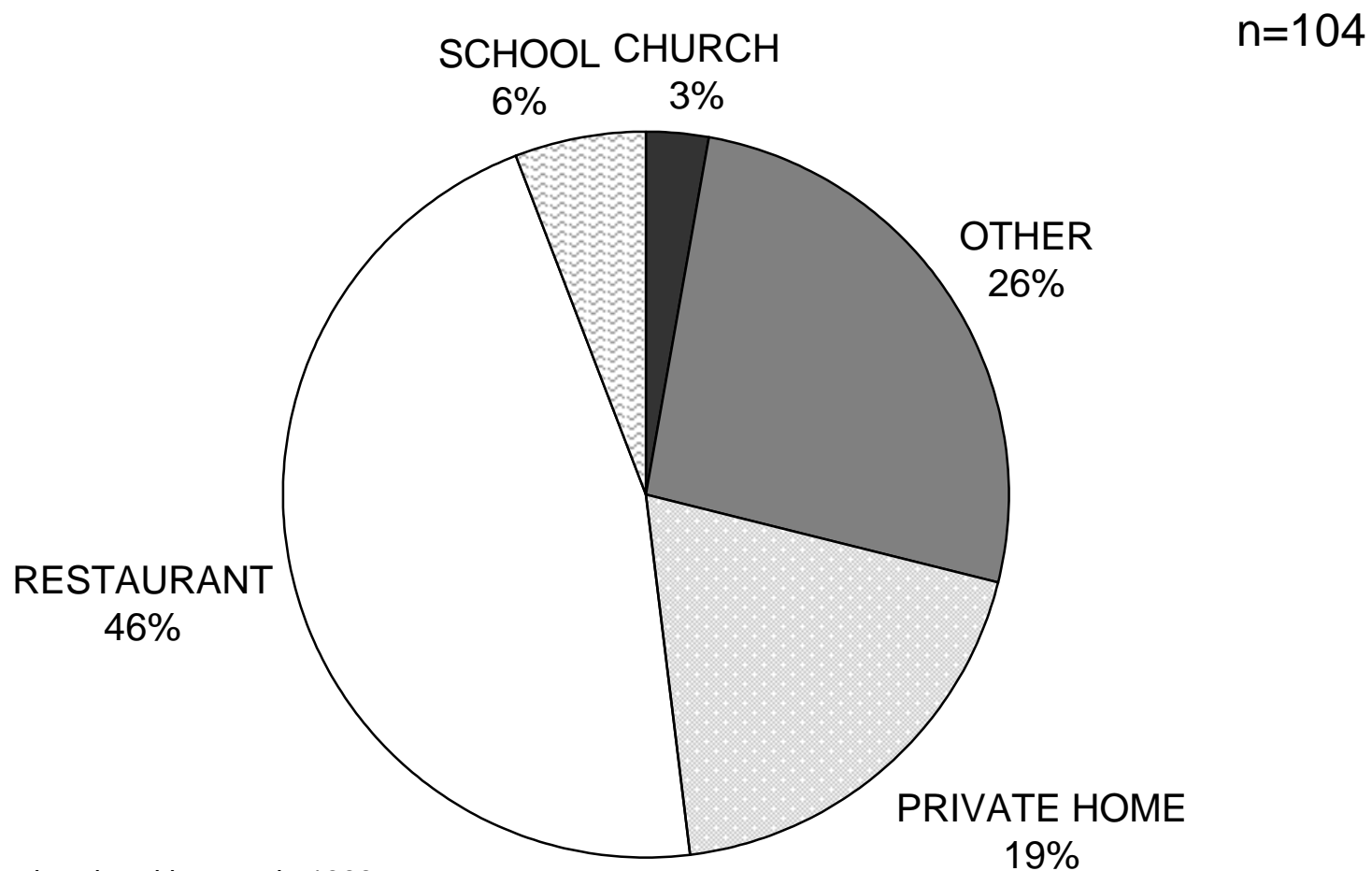
**Figure 3. Reported Foodborne Disease Outbreaks by Month of Onset and Confirmation Status, California, 1998**

n=104



Source: California Department of Health Services, Disease Investigations and Surveillance Branch

**Figure 4. Reported Foodborne Disease Outbreaks by Place of Food Consumption, California, 1998\***



\* Reported outbreaks with onset in 1998

Source: California Department of Health Services, Disease Investigations and Surveillance Branch